

## Early Complications Following Bipolar Hemiarthroplasty for Femoral Neck Fracture in Elderly Patients

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### Abstract

**Background:** The femoral neck fracture is one the most important traumatic event in the elderly, because of its high rate and terrible complications. The most frequently used surgical option for the management of displaced intracapsular femoral neck fractures is the bipolar hemiarthroplasty. This study examines the incidence of early complications following bipolar hemiarthroplasty procedures for the management of femoral neck fractures using posterior approach. **Methods:** We retrospectively reviewed 1 year follow up of 150 patients with displaced femoral neck fracture who underwent hemiarthroplasty at our institution between 2007 and 2012. Several variables including age, sex, medical comorbidities, type of fracture, operation time, intraoperative complications, hospitalization time, surgical site infection, systemic infection, prosthesis dislocation periprosthetic fracture, pulmonary thromboembolism, mortality and Harris Hip score were examined.

**Results:** There were 82 males and 68 females in this study. Mean age of patients was 71.4 years. There were no intraoperative mortality, however, one year follow up mortality rate was 7.33%. There were 6.66% early dislocation and surgical site infection was seen in 2.66% of patients. Venous thromboembolic events occurred in 2.66% of patients. The average HHS improved significantly at one year follow up.

**Conclusions:** Our study showed that bipolar hemiarthroplasty through posterior approach is associated with a modest rate of complications.

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### Introduction

The femoral neck fracture is one of the most important traumatic event in the elderly, because of its high rate and terrible complications (1). Femoral neck fractures occur most frequently in elderly female patients following fall from standing height and may be associated with osteoporosis. Undisplaced femoral neck fractures account for 15% of femoral neck fractures in elderly and are usually treated with internal fixation. There are several surgical options for displaced femoral neck fractures with regard to patient's age, functional status and cognitive function (11). In this group of patients, reduction and internal fixation is associated with significant complications. Therefore, hip arthroplasty is the treatment of choice. However, there is a current debate on whether hemiarthroplasty or total hip arthroplasty is the best option. Hemiarthroplasty is the more often surgical option currently used for the management of displaced intracapsular femoral neck fractures in elderly patients to restore their mobility and prevent of complications related to decreased ambulation following fracture (3).

However, this surgical intervention is not without morbidity and mortality during perioperative period (1,2,3,6,10).

This study examines the incidence of early complications following bipolar hemiarthroplasty procedures for the management of femoral neck fractures using posterior approach.

### Methods

We retrospectively reviewed one year follow up of 150 patients with displaced femoral neck fracture who underwent bipolar hemiarthroplasty through posterior approach at our institution between 2007 and 2012. All patients were referred to our emergency room (ER) department with displaced femoral neck fracture. We tried to optimize medical issues in 48 hours preoperatively. Patients underwent surgery through a posterior approach by single surgeon (SS). Venous thromboembolism prophylaxis was started preoperatively with low molecular weight heparin (LMWH) and continued for 4 weeks postoperatively. We held LMWH 12 hours before surgery and restarted 12 hours after surgery. Patients were mobilized on the

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## Bipolar hemiarthroplasty complications for Femoral Neck Fracture

**Table 1.** Demographic data and hospital outcomes.

	Male	Female	Total
No (percentage)	82(54.8%)	68(45.2%)	150(100%)
Average age (years)	71.65(8.85)	71.14(8.85)	71.42(8.69)
Duration of operation (minutes)	72.74(7.62)	71.13(13.4)	72.01(10.63)
Post-operative length of stay (days)	7.2(3.27)	6.15(2.5)	6.72(2.98)

**Table 3.** Complications at one-year follow-up.

	Male	Female	Total
Mortality	8(5.33%)	3(2%)	11(7.33%)
Prosthesis dislocation	6(4%)	4(2.66%)	10(6.66%)
Infection	3(2%)	3(2%)	6(4%)
Wound infection	2(1.33%)	2(1.33%)	4(2.66%)
Systemic infection	1(0.66%)	1(0.66%)	2(1.33%)
Pulmonary Emboli (PE)	2(1.33%)	2(1.33%)	4(2.66%)
Bed sore	2(1.33%)	0(0%)	2(1.33%)
Heterotopic ossification	0(0%)	1(0.66%)	1(0.66%)
Total	21(14%)	13(8.6%)	34(22.66%)

second postoperative day using a walker frame. Follow-up visits were at 2nd and 4th weeks and 2nd, 6th & 12th months after surgery. Several variables including age, sex, medical comorbidities, type of fracture, operation time, intraoperative complications, postoperative length of stay, postoperative complications and functional outcomes (Harris Hip score: HHS) were examined. SPSS statistical software (SPSS Inc., Chicago, IL, USA) was used for the analysis of data. The level of significance was set at 0.05. A paired t-test was used for analyzing the effects of surgery before and after arthroplasty in each group.

### Results

There were 82 males and 68 females in our study. Mean age of patients was 71.4 years at the time of surgery (range, 49 to 93). A number of 139 patients had Garden type 4 fracture and 11 patients had Garden type 3 fracture. Demographic data and hospital outcomes are shown in Table 1.

There was at least one comorbid condition in 58 patients. Female patients had significantly more comorbidity than male patients ( $p=0.02$ ). Cardiovascular disease was the most common comorbid condition in our patients (Table 2).

We did not have any significant intraoperative complications, other than excessive blood loss. Twenty nine patients needed blood transfusion at the time of surgery. No intraoperative mortality was observed.

**Table 2.** Demographic data & hospital outcomes.

Rheumatoid arthritis	1	0.7%
Kidney disease	7	4.7%
Pulmonary disease	5	3.3%
Gastrointestinal disorders	2	1.3%
Neurological disease	17	11.4%
Cardiovascular disease	57	38%
Diabetes mellitus	32	21.3%
Malignancies	9	6%

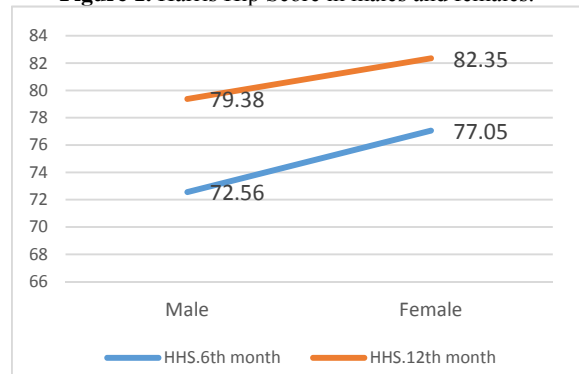
Thirty four complications occurred in 34 patients during the first postoperative year (Table 3). Of these complications, 22 took place in the first month following surgery ( $p=0.03$ ). One-year mortality rate was 7.33%. The rate of complications was the same in female and male patients ( $p=0.2$ ).

There was a significant improvement in HHS at one year follow up. The average HHS increased from 74.5 at 6 months to 80.7 at 12 months ( $p=0.001$ ). The functional score was significantly higher in female patients; however, HHS was the same in both gender in 12th month (Figure 1). Figure 2 shows that younger patients had significantly better HHS measures during follow up ( $p=0.001$ ).

### Discussion

This study showed that bipolar hemiarthroplasty for

**Figure 1.** Harris Hip Score in males and females.



displaced femoral neck fracture in elderly patients through posterior approach improved functional outcome, however, it was associated with modest rate of complications.

We found an overall rate of 23% complications including infection, dislocation, pulmonary emboli (PE), heterotopic ossification and death. Shah et al. reviewed the results of 173508 patients managed with

the bipolar prosthesis and reported similar rate of complications (20%). The incidence of PE, wound infection, urinary tract infection (UTI) and pneumonia were 1.5%, 0.1%, 15.8% and 2.8%, respectively (3). Lu-Yao G *et al.* reported deep infection and PE rates 1.7% and 2%, respectively (4). We found almost the same rate of complications in our patients.

Femoral neck fractures treated with bipolar hemiarthroplasty result in a significantly increased mortality. During the first year after femoral neck fractures a mortality of 11–36 % is reported (14-17). With 11% one-year mortality rate this study is comparable to the literature mentioned above. D'Angelo *et al.* reported 25% one year follow up mortality rate following hemiarthroplasty (1). Eiskjar reported 20% mortality rate at six months and 28% mortality rate at one-year. They found cardiac factors other than previous myocardial infarction; status as a nursing home patient; chronic pulmonary disease; serum creatinine level greater than 1.7 mg/100 ml; pneumonia; previous myocardial infarction; duration of surgery; and gender had significant influence on mortality. However, factors such as age, time delay from admission to surgery, mode of anesthesia, and cerebrovascular diseases had no significant influence on mortality (12). Schnependahl *et al.* showed that mortality after femoral neck fracture treated with bipolar arthroplasty has significantly decreased during last twenty years (13). They concluded that significant decrease in mortality over recent years suggests that bipolar hemiarthroplasty is an increasingly secure treatment option for elderly patients sustaining a femoral neck fracture. We think that our low mortality rate could be related to younger age of our patients.

Dislocation of hip hemiarthroplasties has been a concern for orthopedic surgeons since the advent of the procedure. Furthermore, early dislocation is associated with increased mortality rate (19-20). Manoj Kumar Rajak *et al.* reported 3% prosthesis dislocation following bipolar hemiarthroplasty (10). Unwin *et al.* reported a 6.5% dislocation rate among all their patients, with those having posterior approaches being three times more likely to dislocate (21). We observed 6.6% early dislocation in our series which is comparable to the other series. Though some authors reported no association between surgical approach and dislocation following bipolar hemiarthroplasty (22), an increased risk of dislocation has been shown for the posterolateral surgical approach compared with lateral approaches (23,24,25,26). This increased risk may be reduced by posterior capsule repair and short external rotator reattachment (27,28). We attribute our high rate of dislocation to posterolateral approach we administered in our patients. As the number of patients might not be enough to do more analysis, we could not show if there is any association between patient's age,

gender and risk of dislocation. We also were unable to show if dislocation would increase the mortality rate.

Early surgical complications after bipolar hemiarthroplasty may be the origin of cascades leading to general complications and increased mortality. This is why their prevention is especially important. Surgical approach can affect the type of complication. Though there is no significant difference in overall complication rate, the dislocation rate is higher after a posterior approach while hematoma is higher in anterior approaches. The rates for infection, seroma and perioperative fracture did not differ significantly (29). In our study, postoperative complications were seen in %22.6 of patients. Infection was the third most common complication in our series.

The significant improvement of HHS was seen at one-year follow up. This is along with previous studies that showed good functional outcome for patients who received bipolar hemiarthroplasty for displaced femoral neck fracture (30). We also showed that the younger patients had better functional outcome at the final follow up which related to their better physical and functional status of health at the time of surgery. It is also very important that the functional outcome significantly improved during the first year after surgery.

In conclusion, bipolar hemiarthroplasty in elderly patients with displaced femoral neck fracture through posterior is associated with modest rate of complications. Mortality during the first postoperative year, dislocation and infection are the most frequently encountered complications. However, bipolar hemiarthroplasty has a significant effect on patients' functional status after disabling femoral neck fracture. Therefore, further studies are required to see if modification in surgical techniques and approaches could influence the rate of complications.

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